

Dear Reviewer,

First of all, I would like to thank you for the careful and helpful review. We have improved the text. In the following we list our answers to your comments:

The Authors state: *“The optimum design should be found considering and weighting all different aspects, by using a cost-benefit analysis that is oriented to the preservation of the material fabric with a reduce invasiveness of the intervention works.” (lines: 35-38)*

Has a cost-benefit analysis been performed for the case study involving the Domus of Champignonnet? If so, I would encourage the Authors to briefly describe it.

The cost-benefit analysis, based on a probabilistic approach in terms of loss estimation analysis is now object of our study. At the time of the project just a preliminary analysis has been performed, the different aspects have been considered and weighted for a cost- benefit analysis.

The main aim of the paper is to propose a holistic, interactive design process that should be oriented and changed accordingly even during the execution work. In the Reviewer’s opinion, the paper, particularly Section 3, lacks an accurate presentation and discussion of the main changes, re-directions of the design during the execution work. This aspect is key, particularly to illustrate how the proposed methodology affected the final design.

Section 3 has been rewritten

The Authors state that: “On the other side, most designers are often oriented to use compatible and natural materials, such as wood, stone etc. [5, 6, 7, 8]. For these reasons, during the design process, the decision on the type of intervention and material yields to a different level of safety.” *lines(44-46)*. Can the Authors discuss which criteria were used to select a Corian slab?

The corian has been chosen as far a high resistance strength with a ligh weight, this is aneed to not overload the masonry walls

The Corian has been chosen since a high resistance with a light weight are characteristics that satisfy the design requirement to do not overload the masonry walls.

The sentence in between lines 92-94 needs a reference.

Line 106: why citation [18] is specifically used on that point/context?

Introduction has been rewritten

The paper illustrates the use of new technology, i.e. an application of rubber bearing installed between masonry walls and steel roof. The author frames this technology (as used in the present work) as a Base Isolation System (BIS). In the reviewer’s opinion, it is a BIS for the steel roof that was added over the old structure. But referring to the original masonry wall structure, that system cannot be framed as a BIS. Indeed, the potential shear actions acting on the top of the ancient walls, once the steel roof has been added, is greater than the original one (zero).

About the comparison between pre and post intervention, in the past the structures had a roman roof, and the floors are covered by decorative surfaces to be protected. For these reasons there was

the need to rebuilt a new roof on those walls to avoid invasive structures on the mosaic surfaces. The presence of the rubber bearing instead of a classical connection between roof and underneath walls has allowed to protect the walls from horizontal forces. This is explained in the text.

In agreement with the Authors when they state that: “the need for reversibility and no-invasiveness of the interventions require great attention”. The Authors selected a solution with a steel roof directly installed either on the top of the original walls or over additional “new walls” and using steel plates anchored in the masonry with 2 m long bolted steel bars. This solution does seem invasive. Why did the Authors select this solution instead of having a standing alone roof with its own structure? I would suggest to introduce and illustrate the reasons behind this decision in the paper.

The standing alone structure is very invasive in the archaeological space, and would cover the decorative surfaces. For these reason it was chosen to load the existing walls. The bolted steel bars where inserted in masonry reconstruction.

“The additional loads due to the new roof is transferred indirectly, using an additional masonry built on the top of the ancient walls of the houses.” Looking at Figure 6, it does not seem the load are transmitted indirectly, at least not everywhere.

In most cases a masonry reconstruction has been built.

What is missing is a preliminary study of the horizontal resistance capacity of the walls without a roof. This is key to prove either the need for a connection with a roof or to demonstrate that the roof (directly installed on the walls) does not reduce significantly the horizontal capacity of the ancient original walls.

It seems that the Rubber bearing tensile load is 15 kN, while the pull-out test for the bars gives as results 26 kN. It seems that the rubber is the bootle neck for tensile actions: did the connection bar-wall designed for that purpose? If so, why?

The pull-out tests were performed until extraction of the bars; this limit is over the values of the design ascending wind load. The tests were performed to check the resistance for ascending wind load. The large roof slab and the particular location (over a windy cliff) made the roof very vulnerable to this load condition.

It would be advisable to report the compressive forces due to the roof.

The Authors should discuss better the assessment of the ancient masonry walls (lines 394-396).

These aspects have been improved in the text. More details have been given on the masonry structures.

Line 413: why the reduction (as from Figure 19 and Table 5) is 424%?

The comparison between fix base and isolated configuration shows a reduction in shear of 424% due to the presence of the rubber bearing.

The Introduction or Section 3 would benefit from a discussion/reference to the following works:

- Pagano, M. (1992). Metodologia dei restauri borbonici a Pompei ed Ercolano. Metodologia dei restauri borbonici a Pompei ed Ercolano, 169-191.
- Salassa, C. M. (1999). Le coperture di restauro a Pompei. Rivista di Studi Pompeiani, 10, 91-115.
- Flamini, M. G., Prisco, G., Capanna, F., Guglielmi, A., Caligaris, M. O., & Salerno, C. S. (2000). L'Istituto Centrale per il Restauro a Pompei: interventi nella Casa dei Vettii e nella casa VI 15, 2. Rivista di Studi Pompeiani, 11, 252-262.
- Bergamasco, I., Gesualdo, A., Iannuzzo, A., & Monaco, M. (2018). An integrated approach to the conservation of the roofing structures in the Pompeian Domus. Journal of Cultural Heritage, 31, 141-151.

We thank the reviewer to have evidenced those interesting papers that have enriched our knowledge and the present paper.

Minor Comments

Fig.1 - The Authors are encouraged to work on the Figure in order to make it more compact.

Fig.2 - The Authors are encouraged to work on the Figure in order to make it more compact.

Fig.4 - To improve the readability of image 4a, would be opportune to define the area subjected to restoration works.

Fig.8 - Would be advisable to format figures a and b with the same height

Fig.12 - Please, improve the quality of the image.

Fig.13a - Please, improve the quality of the image.

Line 214: picture -> watercolour

Line 215: “Felix 214 Duban on 1987” -> I think is wrong. Please check it.

Line 214: Please, introduce and add a reference for Fig. 3b

Line 288: to trace - >tracing

Line 296: Please, be consistent using the same unit of measurement.

Table 2: Please, improve the quality of the table, formatting it better (rows can and should be equally spaced)

Table 2: Please, check if the word “square” is a typo

Line 309-314: Please, break the sentence and rephrase it.

Line 388: Please, add a reference([4]) to NTC2008.

Line 394: NCT2008 -> NTC2008

We thanks for these minor comments, the text has been upgraded according to these comments.

Best regards,